Ontario Geological Survey

Northern Ontario
Engineering Geology Terrain Study 43

ROSLYN LAKE AREA

(NTS 42E/SW)

District of Thunder Bay

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John E. Gartner

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MAP
(accompanying report)

Map 5079 (coloured) – Northern Ontario Engineering Geology Terrain Study, Data Base Map, Roslyn Lake (NTS 42E/SW). Scale 1:100 000.

Northern Ontario
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ROSLYN LAKE AREA

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by

John F. Gartner[1]

1.0 INTRODUCTION:

This report contains an inventory of regional engineering terrain conditions in the Roslyn Lake area, District of Thunder Bay. The area, which covers NTS block 42E/SW, lies between Latitudes 49°00′N and 49°30′N and Longitudes 87°00′W and 88°00′W. It forms part of a series of publications which provide similar terrain data for some 370 000 km^2 of northern Ontario.

The purpose of the mapping is to provide a guide for engineering and resource planning functions at a level of detail consistent with a scale of 1:100 000. The terrain information is contained on the Data Base Map (OGS Map 5079, accompanying this report).

Interpretation of existing black and white aerial photographs, at scales of approximately 1:54 000, was the primary method of obtaining this

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terrain information. The interpretation was checked with existing published and unpublished literature which documented previous field visits and observations. During the summer of 1978, roads in the area were traversed and over 300 separate observation points recorded as further verification of the office studies. Thus, the map represents a reconnaissance overview of the engineering conditions of the terrain.

An engineering terrain legend was developed to facilitate the mapping and to provide a common information base for the entire map series. This legend is shown on the accompanying Data Base Map. Further information on the mapping techniques, legend format, and possible uses of this information is available in the "Ontario Engineering Geology Terrain Study Users' Manual" (Gartner, Mollard, and Roed, in preparation), a companion publication to this series of maps and reports.

2.0 GEOLOGICAL SETTING:

2.1 BEDROCK:

The map area is underlain by extremely rugged, well-exposed bedrock of Precambrian age, consisting of felsic igneous rocks, mainly granites, and a variety of migmatites. Metasediments, predominantly schists and gneisses, occur around Dickison Lake in the central part of the map-area and around Barbara Lake and Lake Jean in the northwest corner of the area. In the southeast corner of the area, numerous gold and some base metal occurrences are associated with a belt of intermediate to mafic metavolcanics, metasediments, and mafic to ultramafic igneous rocks (Carter *et al.* 1973). Keweenawan diabase sheets surround Georgia Lake in the northwest corner of the area, producing cuesta-like landforms of rugged relief.

The area is dissected by a number of distinctive, intersecting northeast- and northwest-trending faults. The most prominent of these is the Gravel River-Kamuck River fault, which crosses the central portion of the area. It has formed a steep-walled trench some 60 m wide, with sheer valley walls up to 150 m in height (Carter 1975).

The metasediments in the northwest corner of the map-area have medium potential, particularly for the occurrence of lithium-cesium-beryl-

lium mineralization. Potential of the metavolcanic-metasediment belt in the southeast corner of the area is medium, particularly for gold, copper, and molybdenum. The remainder of the area has least to unknown mineral potential (Springer 1978).

2.2 QUATERNARY:

Glacial ice advanced from the northeast and deposited a very thin, discontinuous veneer of till over the bedrock. This overburden is somewhat thicker along the northern boundary of the map-area than elsewhere. Here, the drift represents the southern edge of a thick till deposit which extends northward into the Jellicoe map-area (Gartner 1979). As the glacial front retreated to the northeast, many of the fault-controlled valleys were filled with meltwater. Deposits of glaciofluvial sand and gravel can be found in many of these valleys, and in other lowland areas. A large esker-outwash complex lies east and north of Wintering Lake.

Zoltai (1967) described a temporary ponding of glacial meltwaters south of Wintering Lake; the present field work confirmed the presence of silt and very fine sand in this area. Carter (1975) attributed a deposit of fine whitish sand on the south shore of McKnight Lake to a glaciolacustrine origin.

3.0 ENGINEERING TERRAIN UNITS:

3.1 BEDROCK:

3.1.1 Description:

Rock knob (RN) terrain dominates the map-area. Fault-scarp valleys and abundant bedrock hills produce a rugged and complex landscape, with relief ranging from 30 to more than 210 m. Slopes are steep and varied, and many of the fault-controlled valleys have high sheer cliffs.

Drift cover in the bedrock areas is thin (less than 1 m) and bare bedrock is common. The overburden becomes thicker on the flanks of some bedrock hills, and boulders are scattered over much of the ground surface.

Typical symbols depicting this terrain unit are:

$$\frac{RN(tMG/R)}{Hj\text{-}M} \qquad \frac{RN(tMG/R)}{Mnj\text{-}M}$$

3.1.2 Significance:

RESOURCES: Portions of the rock can be used for crushed stone purposes, but detailed evaluations of suitability for aggregate use would be required. Ground water resources within the rock will be limited to fractures, faults, and fissures. The occurrence of aquifers is unpredictable and the terrain has only fair potential for ground water supplies.

GENERAL CONSTRUCTION: The major constraint in terms of construction is the presence of massive, irregular, and complex bedrock outcrops, and of large boulders on the ground surface. This means that, in most instances, below-ground excavations will require blasting. Site grading will be expensive and rock fills will be necessary in grading works. Foundation conditions should be excellent on the bedrock, but route alignments will require rock cut-and-fill operations.

Because of the shallow drift cover and complex bedrock slopes, development activities will be more difficult, and hence more expensive, than in areas of thicker overburden. Construction will be extremely difficult in those areas of high, sheer rock cliffs and steep bedrock hills. Also, management of the land for any development would be complex. The variable and steep rock slopes, combined with the shallow overburden, will make the terrain sensitive to surface erosion, especially when cleared of vegetation.

WASTE DISPOSAL: The bedrock terrain is not amenable, in its natural state, to the disposal of waste, whether it be garbage, septic tank effluent, or industrial liquid waste. Development of lagoons or tile fields would require extensive grading of rock materials and importation of soil fill. Fractures in the bedrock could act as conduits for migration of effluents, and impact on surface drainage courses could be significant.

3.2 MORAINAL LANDFORMS:

3.2.1 Description:

Ground moraine (MG) occurs either as a subordinate unit in conjunction with the bedrock, or as the dominant unit where the till cover is thicker. The latter condition is found along the northern boundary of the map-area.

Where the ground moraine till is dominant, it appears to range in thickness from about 1 to 3 m. The moraine materials are cobbly, stony, and bouldery silt and sand tills. Zoltai (1967) reported that two samples from the map-area contained 42 to 65 percent sand, 40 to 55 percent silt, and 3 to 5 percent clay. $CaCO_3$ varied from 0 to 12 percent.

In these morainal areas, bedrock controls the relief and the terrain is moderately undulating. Rock knobs are common, and areas of flat-lying bedrock were noted during the ground reconnaissance.

Examples of terrain unit symbols are:

$$\frac{\text{tMG/RN}}{\text{Lu-M}} \qquad \frac{\text{tMG/R(RN,pOT)}}{\text{Lu-M}} \qquad \frac{\text{tMG/R(RN)}}{\text{Mu-M}}$$

3.2.2 Significance:

RESOURCES: Sand and gravel resources are scarce within these terrain units, and at best, only small pockets of suitable materials can be expected.

Ground water resources are not expected to be significant. The till is generally too shallow to provide good aquifer conditions, and any water will likely be obtained from fractures in the bedrock.

GENERAL CONSTRUCTION: Because the glacial till is bouldery and often forms only a thin veneer over bedrock, there will be a number of construction problems associated with rock excavation and grading. Thus, excavations, except for very shallow ones, will likely intersect bedrock and zones of very bouldery soils. The till has a significant

silt content, and re-use of the materials might entail local problems with handling and compaction, especially during wet weather conditions. Foundation conditions should be adequate for normal structures.

WASTE DISPOSAL: The bouldery nature of the till cover and the existence of bedrock close to surface place constraints on the siting of waste disposal facilities. Septic systems are probably feasible, but site-specific investigations would be required. The till is generally not deep enough to provide a good environment for solid or liquid waste disposal.

3.3 GLACIOFLUVIAL LANDFORMS:

3.3.1 Description:

Eskers (GE), *kames* (GK) and *outwash* (GO) form complex terrain units in the vicinity of Wintering Lake. Esker ridges trend in a southwesterly direction and are composed of gravelly sand and sandy gravel. These ridges are flanked by flat and kettled, sandy textured outwash plains. Knobby kame hills containing more bouldery soils are interspersed with bedrock knobs to complete the association of landform types found in these terrain units.

These units are not widespread within the map area, occurring mainly in the northeast quadrant. Small, isolated esker ridges do occur at a few random localities in other parts of the area. Symbols depicting these terrain units are:

$$\frac{\text{sgGE(RN,sgGK)}}{\text{Mrk-D}} \qquad \frac{\text{gGE,gsGK(RN)}}{\text{Mnr-D}}$$

$$\frac{\text{sgGK,sgGE,sgGO(RN)}}{\text{Lnrk-M}} \qquad \frac{\text{sgGK,sgGE/R(RN)}}{\text{Lun-M}}$$

Outwash (GO) covers some of the narrow valleys in the central and southern parts of the map-area. Here, the terrain has low relief, and terraces and kettles are evident. The material is gravelly sand to sandy gravel, as is the case at the southern end of Long Lake, and on the Gravel

and the Jackpine Rivers near the southern boundary of the map-area. Typical terrain unit symbols are:

$$\frac{\text{sgGO}}{\text{Lpkt-D}} \qquad \frac{\text{gsGO}}{\text{Lt-D}} \qquad \frac{\text{sgGO(RN)}}{\text{Lu-D}}$$

An outwash deposit, extending from Upper Roslyn Lake to the south shore of Wintering Lake, contains appreciable amounts of fine sand and silt. These finer materials may represent glaciolacustrine sediments from a temporary glacial lake which occupied this area (Zoltai 1967). This deposit has been mapped as:

$$\frac{\text{smGO(pOT,RN)}}{\text{Lu-W}} \qquad \frac{\text{smGO,smGK(RN)}}{\text{Mn-M}}$$

Outwash also occurs as a veneer overlying ground moraine in association with bedrock. Within this unit, meltwaters have modified the till surface, leaving various thicknesses of sand over the till. Boulders are often predominant, and bedrock outcrops are common. Typical terrain unit symbols are:

$$\frac{\text{sGO/tMG}}{\text{Lu-M}} \qquad \frac{\text{sGO/RN(RN)}}{\text{Lu-M}} \qquad \frac{\text{sGO/tbMG(mAP,pOT,RN)}}{\text{Lup-Mh}}$$

3.3.2 Significance:

RESOURCES: Potential sand and gravel deposits of commercial size and quality occur within the esker-kame complex east of Wintering Lake. Other similar, but smaller deposits occur about 8 km to the east and west of this major resource. Potential sources of sand and gravel are also found in the outwash deposits at the south end of Long Lake, and on the Gravel and Jackpine Rivers near the southern boundary of the map-area.

The flat outwash deposits, where they are continuous and deep, have some potential for ground water supply, but there does not seem to be any potential for the discovery of large aquifers.

GENERAL CONSTRUCTION: The following general comments describe the construction suitability of the glaciofluvial landforms:

1) Excavations will encounter few problems, except in areas with high water tables (e.g. near McKnight Lake), in areas where there are numerous boulders, and in areas of thin overburden.
2) Material will handle well and compaction should be satisfactory.
3) Bearing capacities for normal structures should be adequate, but site-specific investigations are necessary.
4) Earth grading conditions for general purposes should be good.

WASTE DISPOSAL: Because of the permeable nature of the materials and the possibility of connection between ground waters and surface waters, the disposal of liquid and solid wastes within these landforms must be approached with considerable caution. Septic systems, if properly designed, should cause few concerns. However, landfills and lagoons would require detailed hydrogeological investigations.

3.4 ORGANIC LANDFORMS:

3.4.1 Description:

Organic terrain (OT) is not particularly widespread within the map-area. Small pockets are associated with the rock terrain, but these are of little significance. Larger deposits are associated with the thicker overburden along the northern boundary of the area.

In many cases, the organic peat forms a veneer of varying thickness over outwash sand and/or ground moraine till. Water tables are at or above surface and the organic materials are soft and compressible. Typical terrain unit symbols are:

$$\frac{\text{pOT}}{\text{Lp-w}} \qquad \frac{\text{pOT/sGO/tMG(RN)}}{\text{Lu-w}} \qquad \frac{\text{pOT/sGO(RN)}}{\text{Lp-w}}$$

3.4.2 Significance:

The organic landforms within this map-area should be avoided by human activities. They do not constitute a resource, other than as a habitat for wildlife or as a mechanism for surface flow augmentation. Because the swamps are not extensive and the peat is suspected to form only a thin,

variable layer over mineral soil, the organic terrain is of little economic significance.

Construction in the swamps would have to contend with soft ground conditions, high water tables, and poor access. They are poor locations for waste disposal sites.

4.0 SUMMARY OF ENGINEERING SIGNIFICANCE:

The preceeding section described the characteristics of the major landform types and the engineering and resource significance of these units. Table 1 is a summary of the general engineering significance of the more common terrain units found in the area. This table is intended only as a guide to help the reader in assessing the overall significance of the mapunits. Site-specific work is necessary to better define actual ground conditions. Also, it must be realized that there are a number of conditions, such as drainage and slope, which are not considered in the table but which may affect the engineering significance of the various terrain units.

TABLE 1 SUMMARY OF ENGINEERING SIGNIFICANCE.

		BEDROCK	MORAINAL		GLACIOFLUVIAL			ORGANIC
		RN(tMG/R) Hj-M	tMG/R(RN) Mu-M	sgGE sgGK	smGO Lu-w	sgGO Lu-D	sGO/tMG Lu-M	pOT Lp-W
RESOURCE POTENTIAL	Sand & Gravel	Poor	Poor	Excellent	Poor	Excellent	Fair	N/A
	Ground Water	Poor	Poor	Fair	Good	Good	Fair	Poor
LIGHT CONSTRUCTION CONDITIONS	Excavation	Blasting	Fair	Good	Fair	Good	Fair	Poor
	Foundation	Excellent	Excellent	Good	Fair	Good	Good	Very Poor
	Grading	Difficult	Fair	Good	Fair	Good	Fair	Very Poor
	Material Re-Use	Rock Fill	Good	Excellent	Fair	Excellent	Good	Very Poor
WASTE DISPOSAL SUITABILITY	Septic	Very Poor	Fair	Fair	Fair	Good	Good	Very Poor
	Landfill	Poor	Fair	Fair	Poor	Fair	Fair	Very Poor
	Lagoons	Very Poor	Fair	Fair	Poor	Fair	Fair	Very Poor

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